Woodland Jumping Mouse (*Napaeozapus insignis*) Species Guidance

Family: Zapodidae – the jumping mice

Species of Greatest Conservation Need (SGCN)

State Status: SC/N (Special Concern/no laws regulating use, possession, or harvest) (1996)

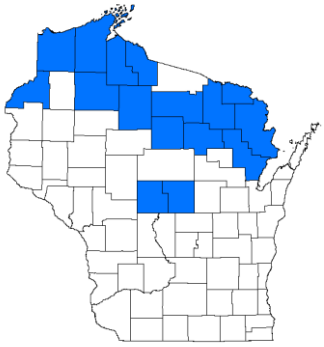
State Rank: S2S3

Federal Status: None

Global Rank: G5

Wildlife Action Plan Mean Risk Score: 3.6

Wildlife Action Plan Area of Importance Score: 2



Counties with documented locations of woodland jumping mice in Wisconsin. Source: Natural Heritage Inventory Database, April 2013.

Illustration by Ryan Stephens

Photo by Paula Spaeth Anich

Species Information

General Description: The woodland jumping mouse (*Napaeozapus insignis*) is the sole member of the genus *Napaeozapus*. Adult woodland jumping mice weigh 19-32 g (0.7-1.1 oz.) (Kurta 1995). Total body length ranges from 210-250 mm (8.3-9.8 in), with tail length 120-155 mm (4.7-6.1 in), hindfoot length 28-33 mm (1.1-1.3 in) and ear height 16-18 mm (0.6-0.7 in) (Kurta 1995). The woodland jumping mouse is marked with bright orange sides, often with a tinge of yellow or red, and peppered with sparse coarse dark black guard hairs. A dark brown to nearly black stripe runs down its dorsum, and the belly fur is pure white. The hind foot is extremely long and resembles the hind foot of a kangaroo. The tail is clearly bi-colored and longer than the length of the head and body. The last five to 20 mm (0.2-0.8 in), and up to 42 mm (1.7 in), of the tail are tipped with white, from which its species epithet, *insignis*, is derived (Whitaker and Wrigley 1972, Long 2008).

Definitive Identification: The woodland jumping mouse can be distinguished from most other Wisconsin mice by a tail that is significantly longer than the total length of head and body, and a hind foot longer than 23 mm.

Similar Species: The woodland jumping mouse closely resembles its congener, the meadow jumping mouse, but can be distinguished by several morphological characteristics. Pelage on flanks of the woodland jumping mouse is more orange compared to that of the meadow jumping mouse, which generally has a straw yellow color (Fig. 1b). The woodland jumping mouse also has a white-tipped tail not found in most meadow jumping mice (*Z. hudsonius*), but a small proportion of woodland jumping mice do not express this white tip (Wrigely 1972) and some meadow jumping mice (particularly in southern Wisconsin) can have a white-tipped tail (Schorger 1951). The white tipped tail may also occur in the white footed mouse (*Peromyscus leucopus*) and deer mouse (*P. maniculatus gracilis* and *P. m. bairdii*; R. Stephens pers. obs.). Consequently, the white tipped tail is diagnostic for the woodland jumping mouse, but it should be used with caution (Fig. 1a). The woodland jumping mouse is generally larger than the meadow jumping mouse and has a tail that is more bicolored and well-haired (Long 2008). The skulls of *N. insignis* and *Z. hudsonius* can quickly be distinguished by lack of upper premolars in *N. insignis* for a total of three upper molars compared to four in *Z. hudsonius* (Fig 1.c). Considering the geographic variation in pelage of *Z. hudsonius* and the possibility of misidentification because of a white-tipped tail, dentition can be used as the definitive identification. The woodland jumping mouse can easily be distinguished from voles and other mice by its longer tail and hind foot. The skull can be separated from other rodents by grooved upper incisors which only occur in *Z. hudsonius*, the western harvest mouse (*Reithrodontomys megalotis*) which has a smaller infraorbital foramen and generally does not occur within the range of *N. insignis*, and the southern bog lemming (*Synaptomys cooperi*) which has a more robust skull and molars that have edges resembling a zigzag pattern.

Associated Species: Mammalian predators of the woodland jumping mouse in Wisconsin include weasels (*Mustela* spp.), mink (*Neovison vison*), red foxes (*Vulpes vulpes*), gray foxes (*Urocyon cinereoargenteus*), wolves (*Canis lupus*), striped skunks (*Mephitis mephitis*), bobcats (*Lynx rufus*), and house cats (*Felis catus*) (Jackson 1961, Kurta 1995, Long 2008). Avian predators include red-tailed hawk (*Buteo lineatus*), eastern screech owl (*Megascops asio*), and great horned owl (*Bubo virgineanus*) (Jackson 1961, Kurta 1995, Long 2008). Commonly associated small mammals include the northern short-tailed shrew (*Blarina brevicauda*), southern bog lemming (*Synaptomys cooperi*), southern red-backed vole (*Myodes gapperi*), masked shrew (*Sorex cinereus*), pygmy shrew (*S. hoyi*), star-nosed mole (*Condylura cristata*), eastern chipmunk (*Tamias striatus*), white footed mouse (*Peromyscus leucopus*), and woodland

deer mouse (*P. maniculatus*) (Hamilton 1935, Wrigley 1972).

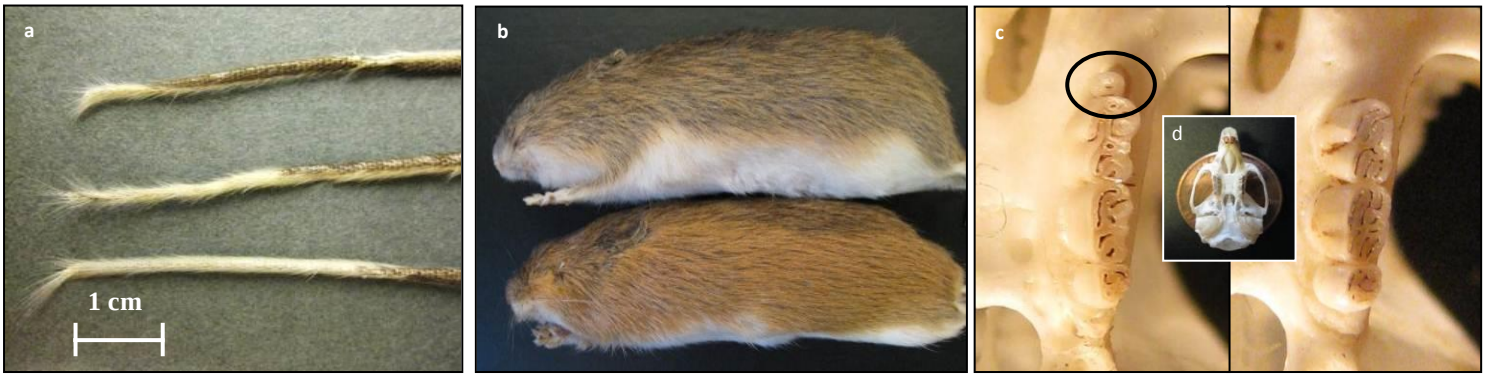
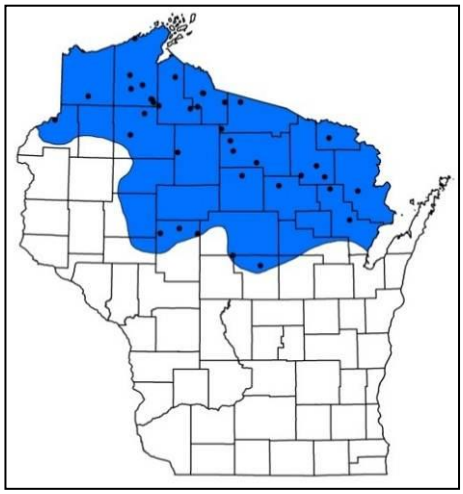


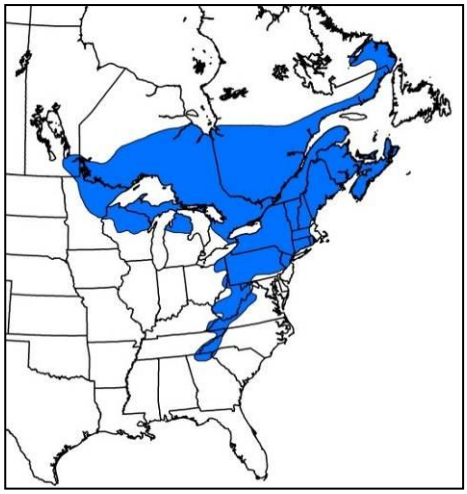
Figure 1. Diagnostic features of the woodland jumping mouse: a) length of the white tail tip can vary in the woodland jumping mouse, as shown in these UW-Stevens Point museum specimens; b) museum specimens showing the pelage of the meadow jumping mouse (top) and woodland jumping mouse (bottom); c) meadow jumping mouse (left) has an upper premolar that is absent in the woodland jumping mouse (right); and d) skull of the woodland jumping mouse (center) on a penny for reference. Photos © Ryan Stephens.

State Distribution and Abundance: The woodland jumping mouse is restricted to the central and northern portions of Wisconsin, and its southern limit is marked by the Canadian life zone which lies from Burnett County in the Western Wisconsin, to Clark and Portage Counties in central Wisconsin, and Oconto County in western Wisconsin (Fig. 4) (Jackson 1961, Long 2008). This species is not known to occur on the Door County peninsula (Jackson 1961). The woodland jumping mouse has always been rare in Wisconsin and was only represented by 48 museum specimens as recently as 2011 (J. Rosenberg,WDNR pers. comm.). Distribution information for this species may not reflect its full extent in Wisconsin because many areas of the state have not been thoroughly surveyed.

Global Distribution and Abundance: The woodland jumping mouse is limited to the eastern portion of North America. The northern portion of its range occurs from southern Manitoba through central Ontario, Quebec, and Newfoundland, Canada. The southwestern periphery of its range occurs in Minnesota, Wisconsin and Lower Michigan, to the east, it occurs from Maine, throughout the Appalachian Mountains, and into the northern portion of Georgia. The woodland jumping mouse is generally uncommon to rare throughout its range and is often local in occurrence (Wrigely 1972). It is especially rare in the western portion of its range, including Wisconsin and adjacent states (Wrigely 1972). It can be fairly abundant within local pockets in the Appalachian Mountains (Hamilton 1935) and has been taken in Michigan in great numbers (Blair 1941); however, this species has declined in Michigan in recent decades (Myers et al. 2009).



Range of the woodland jumping mouse in Wisconsin. Dots represent museum records (Stephens 2011).

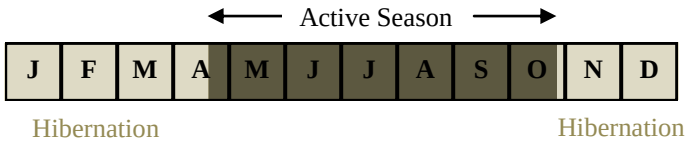


Distribution of the woodland jumping mouse in North America (modified from Wrigley 1972).

Diet: Foods of the woodland jumping mouse include various seeds, vegetation, insects, and insect larvae, including seeds of the miterwort (*Mitella dipylla*), and May-apple (*Podophyllum peltatum*) (Hamilton 1935,Wrigley 1972). The woodland jumping mouse practices mycophagy or the consumption of fungi. It primarily consumes hypogeous (underground) fungi of the genera *Glomus*, *Sclerocystis*, and *Endogone* (Ovaska and Herman 1986, Orrock et al. 2003). Fruiting bodies of these fungi are consumed from May through September, with peak consumption occurring in July through September, and may comprise over 30% of the diet (Whitaker 1963, Ovaska and Herman 1986). Seeds also make up a sizable portion of the diet, along with caterpillars (Lepidoptera), vegetation, and *Rubus* fruit (raspberries and blackberries) when in season (Sheldon 1938, Whitaker 1963, Wrigley 1972). The woodland jumping mouse does not hoard food at any point during the year (Wrigley 1972).

Reproductive Cycle: Breeding begins in May and can occur as soon as the animal emerges from hibernation (Wrigley 1972). The gestation period is between 23 and 29 days, with 23 days being most common (Wrigley 1972, Whitaker and Wrigley 1972). Most young are born in June, but the breeding season extends to the end of August and a second litter is often born in August (Blair 1941, Whitaker and Wrigley 1972). Litter size can vary from two to seven individuals, with an average litter of four or five pups (Whitaker and Wrigley 1972). Pups are born hairless with closed eyes, and weigh about a gram (Layne and Hamilton 1954). Young stay within the burrow until they wean at about four to five weeks (Wrigley 1972). Juveniles at this point resemble adults in size and form, but pelage is duller in appearance and approximates that of *Z. hudsonius* (Layne and Hamilton 1954). By September, the population may be comprised of 70% young of the year (Whitaker and Wrigley 1972). Juveniles do not breed until their second year (Whitaker and Wrigley 1972).

Ecology: Tooth-wear evidence suggests that these mice may live as long as three to four years, but most probably live less than a year in the wild (Whitaker and Wrigley 1972). Woodland jumping mice are mainly nocturnal, but they may be crepuscular (active at dawn and dusk), especially when the weather is cloudy or rainy (Sheldon 1934). Woodland jumping mice often occur in groups or at high densities within a localized area (Sheldon 1938); however, it is likely that this pattern is a function of limited suitable habitat and not a colony (Wrigley 1972). Activity may be greater on cooler nights (40° C/F) and on nights that are cloudy and rainy (Hamilton 1935, Brower and Cade 1966), but no difference in activity was noted by Wrigley (1972). Despite the bright orange pelage on the woodland jumping mouse's flanks, this species is extremely difficult to detect amongst the dried leaves and other forest litter it inhabits (Wrigley 1972). The dark dorsal band running the length of its back, along with the long tail, helps break up its form (Sheldon1938). This animal's main defense is to hold extremely still to avoid detection, but when startled it uses its large hind legs and bipedal locomotion to leap to the nearest cover (Sheldon 1938). The woodland jumping mouse is able to traverse 1.8 meters (6 ft) with a single leap, using its tail for balance, but jumps of 0.6-0.9 m (2-3 ft.) are more common (Hamilton 1935, Wrigley 1972). Despite the species' jumping abilities, most of its movement is cursorial (not leaving the ground). Woodland jumping mice are, however, able climbers and ascend raspberry and blackberry stems during the summer in search of berries (Hamilton 1935).



Hibernation: The woodland jumping mouse, like its congener the meadow jumping mouse, is a true hibernator. Although little is known regarding preferred hibernacula, they likely select well-drained areas (Wrigley 1972). Decrease in day length causes a physiological response in jumping mice that causes them put on fat reserves two weeks before hibernation (Neumann and Cade 1964). By the time mice enter hibernation they have gained ≥ 25% of their starting body weight in fat, and this weight gain causes them to become more clumsy and vulnerable to predation (Blair 1941). Adults generally enter hibernation by the end of September or early October, but can become active again during warm weather (Layne and Hamilton 1954, Wrigley 1972). Juveniles and sub-adults generally take longer to put fat on, likely because they are still growing, and enter hibernation in mid to late October (Wrigley 1972). Mice within a captive setting in New York state were active as late as November 30 (Layne and Hamilton 1954), but activity this late in the year seems unlikely in a natural setting because wild specimens are not captured after the end of October (Wrigley 1972). The woodland jumping mouse does not store food during the winter and relies solely on fat reserves. Failure to put on enough fat before hibernation likely ends in death (Whitaker and Wrigley 1972). During hibernation, the woodland jumping mouse curls into a tight ball with the head drawn tightly into the vent region and hind feet tucked on either side of the head; the tail is wrapped around the body (Hamilton 1935). Males generally emerge from hibernation in early May, while females wait until the end of May (Wrigley 1972). During hibernation, which can be as long as seven months, mice may lose as much as 30 to 35% of their body weight (Hamilton 1935).Woodland jumping mice emerge in the spring, when the snow has melted and the ground thaws (Hamilton 1935), and the earliest record is mid-April (Wrigley 1972). Little is known about winter survival, but information from externally penned animals in New York indicates that this period can be stressful, and eight of 11 mice die during the winter (Hamilton 1935). However, it should be noted that mice in this study were confined to a relatively small area, and these numbers probably do not reflect the true hibernation mortality in the wild. Nevertheless, it is likely that hibernation for six months is physiological stressful and cold winters with little snowpack and spring flooding can cause high mortality rates (Wrigley 1972).

Natural Community Associations (WDNR 2005 and WDNR 2009, but modified by R. Stephens based on unpublished data, Jackson 1961, Wrigley 1972, and Long 2008)**:**
Significant: northern wet-mesic forest, northern mesic forest, tamarack poor swamp, black spruce swamp, and boreal forest
Moderate: shrub carr, alder thicket, muskeg, open bog
Minimal: northern dry mesic forest, northern sedge meadow

Habitat: The woodland jumping mouse occurs in mesic habitats dominated by coniferous forests and boreal swamps (Hamilton 1935, Whitaker 1963, Vickery 1981, Bowman et al. 2001, Brannon 2005). It also occurs, occasionally, in hardwood forests (Schmidt 1931, Sheldon 1938, Kirkland and Griffin 1974). Wrigley (1972) reports that balsam fir is an important habitat element in the eastern portion of the species' range but not in the western portion (Wrigley 1972), but recent data suggest that balsam fir may in fact also be important for the woodland jumping mouse in northern Wisconsin (P. Anich pers. comm.). Important tree species in more of the woodland jumping mouse's range are black spruce, tamarack, paper birch, balsam poplar, and quaking aspen, especially in earlier stages of succession (Wrigley 1972). Forested wetlands, especially those of white cedar, are important in Wisconsin (Long 2008). The woodland jumping mouse may be found in many seral stages from seedlings to mature forest (Healy and Brooks 1988), but in West Virginia the mouse was least abundant when the forest was in the sawtimber stage of timber production (Healy and Brooks 1988).

Coarse woody debris (CWD), especially in the later stages of decay, is an important woodland jumping mouse habitat component (Bowman et al. 2001, Brannon 2005). CWD provides foraging cover and nesting sites, but logs in the later stages of decay have an even more important role because they contain higher volumes of mycorrhizal fungi that are an important food for the mouse in mid- to late summer (Cole and Batzli 1979, Brannon 2005). Heavy ground cover is also very important in explaining the presence of the woodland jumping mouse (Snyder 1924, Whitaker 1963, Kirkland and Griffin 1974, Vickery 1981) and may actually be more important than dominant tree species (Brower and Cade 1966). Rocky areas within forests may also provide suitable habitat (Whitaker 1963). The presence of heavy shrub cover is an important predictor of the woodland jumping mouse, but overall structure is more important than the actual species composition (Brower and Cade 1966, Bowman et al. 2001). Streamsides and small forest openings have been noted as prime habitat for the woodland jumping mouse (Snyder 1924, Green 1925, Hamilton 1935), but the high densities of woodland jumping mice often found along streams are likely an artifact of greater herbaceous and shrub cover and not physiological water requirements (Whitaker 1963, Brower and Cade 1966). Surface water does not seem to be necessary, but wet and mesic habitats are preferred and xeric conditions avoided (Wrigley 1972).

Photos illustrating habitats used by the woodland jumping mouse (left to right): **a.** Northern wet-mesic forest (Portage Co. WI) **b.** Shrub carr along stream near forest edge (Douglas Co. WI) **c.** Stream running through northern mesic forest (Burnett Co. WI) **d.** Edge of tamarack poor swamp (Douglas Co. WI). © Ryan Stephens

Because of habitat needs, this species has been suggested as an indicator of healthy forests at the stand level for both upland and lowland conifers in the province of Ontario (McLaren et al. 1998). However, although the woodland jumping mouse is often touted as a mature forest specialist, it does not seem to occur deep within forests where herbaceous and shrub cover are generally low; instead it may be better categorized by its use of forest edge (Brower and Cade 1966). The woodland jumping mouse only occasionally ventures out into more open areas, and is never far from woodlands or shrub-dominated areas (Wrigley 1972). Its occurrence in more open areas may be limited by competition with the meadow jumping mouse. Removal experiments have shown meadow jumping mice to effectively displace woodland jumping mice in areas where shrubby habitat separates a wooded area from a more open grassland or sedge meadow (Brower and Cade 1966) and often in marginal habitat (Wrigley 1972). Ultimately, it is unlikely that the two jumping mice compete to any appreciable degree (Wrigley 1972). The woodland jumping mouse seems to have an inverse relationship and abundance with the southern red-backed vole. Southern red-backed voles are rarely captured in great densities with the woodland jumping mouse, and when one is present, the other is generally found at low densities or is completely absent (Blair 1941, Brower and Cade 1966). This separation may be a habitat preference and not related to direct competition with one another (Brower and Cade 1966).

Density and home range: Given the local abundance and distribution of the woodland jumping mouse, density estimates likely vary widely by habitat. Density in Michigan has been calculated at 0.26-3 mice/acre and in New York it can reach as high as 5.2 mice/acre (Blair 1941, Burt 1946, Manville 1949, Brower and Cade 1966). Home range of the woodland jumping mouse can be quite large, and in Michigan Blair (1941) found that females had home ranges from 1.0-6.5 acres and males ranged from 1.0-9.0 acres. Home ranges of males and females often overlap (Blair 1941). The woodland jumping mouse may traverse long distances in a relatively short period – as far as 450 m in 24 hours (Ovaska and Herman 1986).

Nesting and runways: Woodland jumping mice use burrows for nesting during the day and for hibernation (Hamilton 1935, Wrigley 1972). They can excavate their own burrows, but often use those dug by other small mammals (Wrigley 1972). They also use burrows to raise young. One such burrow was described by Snyder (1924) as a gently sloping tunnel just over one meter long. The nest was constructed approximately 35.5 cm (14 in.) down the tunnel, was composed of dried leaves, and measured approximately 11.4 cm (4.5 in.) wide. The nest contained five young (Snyder 1924). Burrow entrances are concealed during the day and are nearly impossible to

locate due to the sealed entrance (Snyder 1924, Wrigley 1972). Brush piles may also be used for rearing young (Stupka 1934). Woodland jumping mice generally do not have well developed runways, but they often use existing structures such as small stream banks and logs to move along (Hamilton 1935). They also use runways made by other small mammals and larger animals such as beaver and deer (Sheldon 1934, 1938).

Threats: Habitat loss and conversion is one of the biggest threats to the woodland jumping mouse. Development around lakes, which changes the vegetation structure and composition, reduces habitat quality for the woodland jumping mouse (Racey and Euler 1982). Although many types of forest management do not reduce woodland jumping mouse populations (Healy and Brooks 1988, Kaminski et al. 2007), forest conversion into softwood plantations does negatively impact abundance (Bowman et al. 2001). This species' avoidance of plantations may arise from a lack of microhabitat elements such as herbaceous cover and coarse woody debris. Forest practices that remove all coarse woody debris and snags from a stand may also reduce the quality of woodland jumping mouse habitat. Stream channelization can also have a strong negative impact, and was found in Vermont to reduce occupancy by woodland jumping mice by over 90% (Passardt and Dodge 1978). The effects of channelization lasted for two years and may have been a result of reduced stream side herbaceous cover (Passardt and Dodge 1978). Destruction of seeps or herbaceous cover along streams and other small river-ways, especially those within forested areas, likely reduces the habitat of the woodland jumping mouse.

Climate Change Impacts: Climate change is an imminent threat to the woodland jumping mouse in Wisconsin and may already be manifesting itself as reduced abundance and range contractions. Few specimens of this species have been taken in the last few decades. Numbers of museum specimens in Michigan have also declined within the last few decades (Myers et al. 2009). The woodland jumping mouse's current southern distribution is limited by summer temperature, and the species does not occur in areas where the average summer temperature in July and August exceeds 21° C (69.8° F; Wrigely 1972). This thermal limitation is likely caused by lack of suitable habitat because this species selects for microhabitats within forests, but the woodland jumping mouse is also physiologically intolerant of high heat and cannot survive prolonged exposure to temperatures above 37° C (98.6° F; Brower and Cade 1966). Predicted warming trends, especially warmer winters (WICCI 2011), suggest that many northern forest types will move further north and thereby reduce woodland jumping mouse habitat in Wisconsin (Bachelet et al. 2001, Iverson and Prasad 2001). Northern white cedar and spruce will be especially affected by climate change (Iverson and Prasad 2001), and these and other climate-sensitive boreal tree species are particularly important components of natural communities such as boreal forest, northern mesic forest, northern wet-mesic forest, and black spruce swamps; all important habitats for the woodland jumping mouse. Woodland mouse distribution in New York is affected by the presence of boreal vegetation (Brower and Cade 1966). Reduced snowfall, as a result of climate change, is also a concern because deep snow provides insulation from the cold temperatures during winter hibernation (Merritt et al. 2001).

Survey Guidelines: Live trapping for the woodland jumping mouse should only be attempted by individuals experienced in trapping and handling small mammals. Live trapping can be used to assess the status, distribution, and habitat requirements of the woodland jumping mouse. If surveys are being conducted for regulatory purposes, survey protocols and surveyor qualifications must first be approved by the Endangered Resources Review Program (see *Contact Information*).

This species is a habitat specialist, and therefore locating and trapping in suitable habitat is important to increase capture probability. Edge habitat with high densities of shrubs and herbaceous cover is important to this species, so good trapping locations are along forest streams, small forest clearings, and the transition zone from wetland to upland forests. Sherman live traps are adequate (Brower and Cade 1966, Kirkland and Griffin 1974, Brannon 2005), but pitfall traps may be more effective (Stephens 2012). Successful baits include sunflower seeds and peanut butter with rolled oats (Sheldon 1938, Blair 1941, Brower and Cade 1966). Trap arrangement is important when surveying for small mammals; if presence data are adequate, transects of traps are preferred over grids because they effectively sample a larger area (Read et al. 1988, Pearson and Ruggiero 2003). Transects also allow the researcher to examine and quantify changes in habitat gradients better than grids. Detecting woodland jumping mice may require trapping for a week or more (Sheldon 1938). This may be due to trap shyness or large home ranges that reduce the probability that a mouse will come into contact with a trap (Sheldon 1938).

Tracking plates are not useful for detecting woodland jumping mice in Wisconsin because tracks are indistinguishable from those of the meadow jumping mouse (Glennon and Porter 2007). Woodland jumping mice may be more active on cooler nights (40° F) and on nights that are cloudy and rainy (Hamilton 1935, Brower and Cade 1966). However, mortality in pitfall traps is higher during nights with rain, and proper precautions should be taken to reduce mortality (Stephens 2012). Mice may become torpid and curl into a ball similar to that found during hibernation during cold nights when insufficient food is available within the trap (Klein 1957). Mice may appear dead and show little sign of breathing, but they can be revived to a mobile condition by warming the animal with the hands and placing them in the sun upon release (Klein 1957).

Summarize results, including survey dates, times, weather conditions, number of detections, detection locations, and behavioral data, and submit via the WDNR online report: <http://dnr.wi.gov, keyword "rare animal field report form">.

Management Guidelines

The following guidelines typically describe actions that will help maintain or enhance habitat for the species. These actions are not mandatory unless required by a permit, authorization or approval.

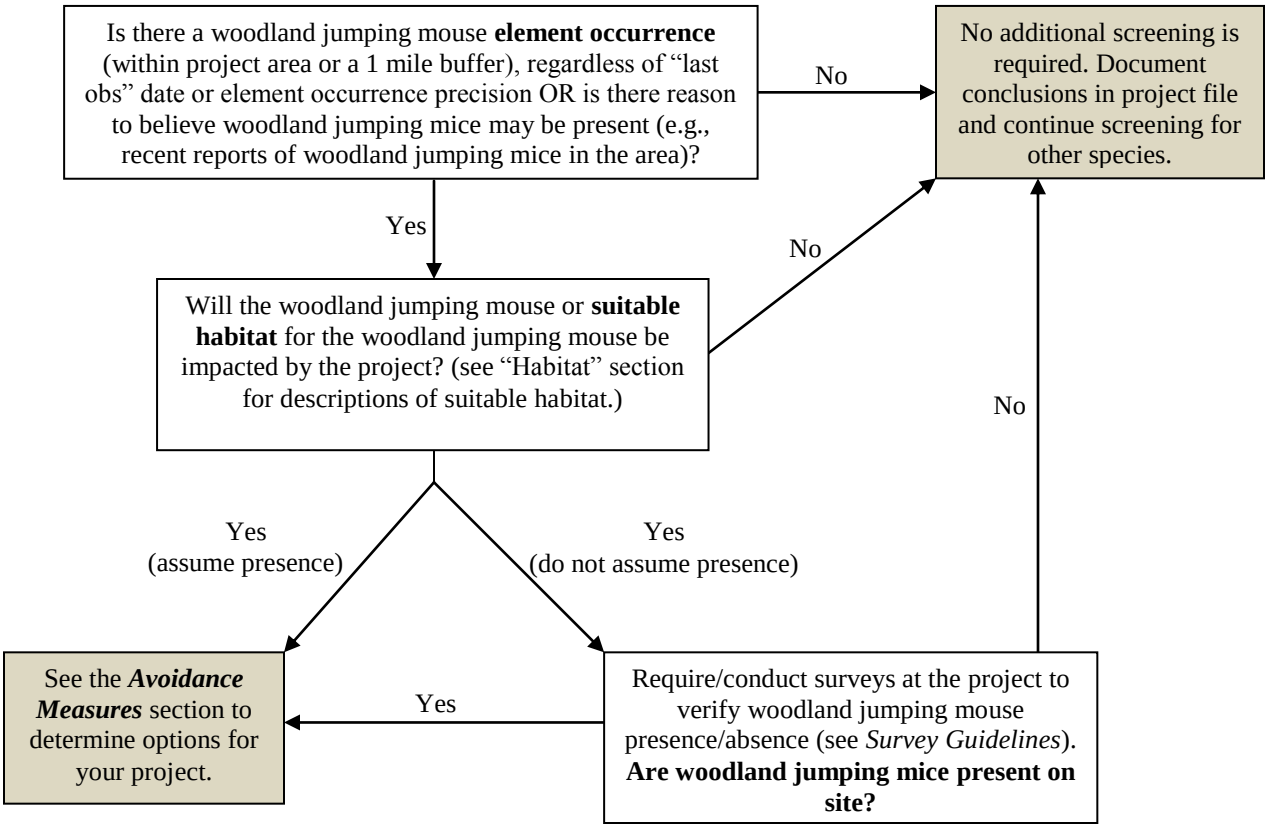
Wet and mesic forests in the forest transition, northwest sands, northwest lowlands, Superior coastal plain, north central forest, northern highland and northeast sands ecological landscapes are important habitats for the woodland jumping mouse. The woodland jumping mouse is rare in Wisconsin (< 50 museum records), and its habitat requirements are known largely from studies in the eastern and northeastern United States where it is more common (Bowman et al. 2001, Green 1925, Healy and Brooks 1988, Kaminski et al. 2007). Best habitats for woodland jumping mice in Wisconsin are inferred from these studies to be mesic hardwood stands and conifer swamps. Protecting and managing these stands and adjacent forest edge at the interface with wetlands or bogs is important.

Avoid disturbing herbaceous cover or shrubs, especially in summer months. Minimize destruction of herbaceous cover, particularly along small streams. Leave large volumes of logs and limbs on the forest floor after harvest – particularly large-diameter logs – to create cover, nesting sites, and foraging areas. Leave snags, especially large-diameter snags and those in later stages of decay, which provide important habitat in the future when they descend to the forest floor (while providing for other cavity-dwelling species in the interim). Limit management around forested seeps, springs, and small streams, because these areas often provide optimal habitat for the woodland jumping mouse.

Screening Procedures

The following procedures should be followed by DNR staff reviewing proposed projects for potential impacts to the species.

Follow the "Conducting Endangered Resources Reviews: A Step-by-Step Guide for Wisconsin DNR Staff" document (summarized below) to determine if woodland jumping mice will be impacted by a project (WDNR 2012):



Avoidance Measures

The following measures are specific actions required by DNR to avoid take (mortality) of state threatened or endangered species per Wisconsin's Endangered Species law (s. 29.604, Wis. Stats.) These guidelines are typically not mandatory for non-listed species (e.g., special concern species) unless required by a permit, authorization or approval.

If you have not yet read through *Screening Procedures*, please review them first to determine if avoidance measures are necessary for the project.

The only way to completely avoid take of woodland jumping mice is to avoid known woodland jumping mouse locations and areas of suitable habitat (described above in the "Habitat" section and in *Screening Procedures*). This approach would include avoiding active management in forests where the species is known or suspected to occur. However, this species is not protected by law, is difficult to avoid because it occurs in widely distributed natural communities, and benefits from some types of active habitat management. When take cannot be avoided, we recommend referring to the *Management Guidelines* above for practices that can minimize impacts or even enhance habitat and improve this species' ability to persist over the long-term.

Additional Information

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Linked Websites:

- Natural Communities of Wisconsin: <http://dnr.wi.gov, key word "natural communities">
- Rare Animal Field Report Form: <http://dnr.wi.gov, key word "rare animal field report form">
- Wisconsin Endangered and Threatened Species: <http://dnr.wi.gov, key word "endangered resources">
- Wisconsin Wildlife Action Plan: <http://dnr.wi.gov, key word "Wildlife Action Plan">

Funding

- Natural Resources Foundation of Wisconsin: <http://www.wisconservation.org/>
- USFWS State Wildlife Grants Program: <http://wsfrprograms.fws.gov/subpages/grantprograms/swg/swg.htm>
- Wisconsin Natural Heritage Conservation Fund
- Wisconsin DNR Division of Forestry

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